



UNIVERSITI
TEKNOLOGI
MARA

PROCEEDING FOR INTERNATIONAL COLLOQUIUM ON NEXTGEN CONSTRUCTION

2025

*Future-Ready Construction and Facility Management:
Driving Research and Innovation for a Smart Built Environment*

**PROCEEDING FOR
INTERNATIONAL COLLOQUIUM ON
NEXTGEN CONSTRUCTION
2025**

Organiser:

Universitas Pamulang (UNPAM)

Co-organiser:

Department of Built Environment Studies and Technology,
Faculty of Built Environment,
UiTM Perak Branch

Faculty of Built Environment, UiTM Sarawak Branch

Colloquium Date:

6 May 2025

Unit Penerbitan UiTM Perak, 2025

All rights reserved. No part of this publication may be reproduced, copied, stored in any retrieval system, or transmitted in any form or by any means; electronic, mechanical, photocopying, recording, or otherwise; without permission on writing from the director of Unit Penerbitan UiTM Perak, Universiti Teknologi MARA, Perak Branch, 32610 Seri Iskandar Perak, Malaysia.

Perpustakaan Negara Malaysia

Cataloging in Publication Data

No e- ISBN: 978-967-2776-60-4

Cover Design : Nur'Ain Ismail

Typesetting : Nur'Ain Ismail

AWARENESS OF RECYCLING PRACTICE IN CONSTRUCTION WASTE MANAGEMENT AMONG G7 CONTRACTORS IN THE EAST COAST OF MALAYSIA

Nik Fahda Aisyah Nik Abdul Jamal¹, Nur'Ain Ismail^{1*}, Norakmarwati Ishak¹,
Adnin Syaza Jaafar¹ and Noraidawati Jaffar¹

¹ Department of Built Environment Studies and Technology, Faculty of Built Environment,
Universiti Teknologi MARA, Perak Branch, Malaysia

*Corresponding Author: nurai948@uitm.edu.my

Abstract

The construction industry in Malaysia plays a vital role in economic development but also contributes significantly to environmental degradation through construction waste. Despite the promotion of recycling as part of the 3R (Reduce, Reuse, Recycle) framework, Malaysia's construction recycling rate remains low at 5%, attributed to challenges such as limited infrastructure, resource constraints, and low awareness among contractors, particularly G7 contractors. This study evaluates the awareness of recycling practices among G7 contractors in East Coast, Malaysia, and identifies gaps and barriers in their understanding and implementation of recycling. A quantitative method was employed, with structured questionnaires distributed to 50 from 215 contractors (G7) registered with the Construction Industry Development Board (CIDB). The data were analyzed using SPSS to assess awareness levels, the relationship between firm size and recycling awareness, and differences in awareness among contractors. Results revealed that 9 out of 11 recyclable materials were recognized, with paper (mean = 4.32), brick (4.22), and ferrous metals (4.18) being the most acknowledged. A positive correlation ($r = 0.35$, $p < 0.05$) was found between firm size and recycling awareness, indicating that larger contractors exhibit higher awareness due to greater resources and sustainability initiatives. Smaller contractors faced barriers such as financial constraints and lack of knowledge. The study highlights the need for targeted interventions, including enhanced training, government incentives, and improved infrastructure, to bridge the gap between large and small contractors. Raising awareness of existing policies and providing tailored support can significantly improve recycling adoption, contributing to sustainable construction waste management in Malaysia.

Keywords: Recycling, Construction Waste, G7 Contractors, Sustainability, Malaysia

1. INTRODUCTION

The construction industry in Malaysia is crucial for the nation's economic development, but it also contributes significantly to environmental degradation through construction waste generation. Recycling, as part of the 3R (Reduce, Reuse, and Recycle) framework has been widely promoted to minimize environmental impact. However, the adoption of recycling practices remains limited, with Malaysia's construction recycling rate still at a modest 5% (Ng et al., 2020). This is largely due to challenges such as limited recycling infrastructure, inadequate resources, and a lack of awareness among contractors, particularly in the G7 category (Sulaiman & Hashim, 2023). Despite recognizing the economic and environmental benefits of recycling, many contractors are not fully implementing these practices due to varying levels of awareness and understanding (Kamranfar & Ramesh, 2022).

This study aims to evaluate the awareness of recycling practices among G7 contractors

in Terengganu, Malaysia, and identify the gaps and barriers in their understanding and implementation of recycling. The study explores the impact of firm size, available resources, and government policies or incentives on the contractors' recycling awareness and practices. By focusing on these factors, this research seeks to provide insights that will contribute to improving recycling adoption in Malaysia's construction industry, supporting sustainability efforts across the sector (Zou et al., 2020; Sulaiman & Hashim, 2023).

2. LITERATURE REVIEW

Recycling in construction waste management is crucial for mitigating the environmental impact of construction activities. In Malaysia, the recycling rate of construction waste remains low, hovering around 5%, despite the widespread promotion of the 3R principles (Ng et al., 2020). Contractors, particularly G7 contractors, are central to the implementation of these recycling practices as they handle large-scale construction projects. Studies have shown that the awareness of recycling among contractors is often limited. While large firms are generally more aware of recycling practices due to their access to more resources, training, and sustainability initiatives, smaller firms tend to face challenges related to costs, resources, and knowledge (Esa et al., 2017). G7 contractors are expected to lead in the adoption of recycling practices, yet their level of awareness and engagement with recycling practices is inconsistent.

Factors such as lack of knowledge, the perceived high cost of recycling, and insufficient recycling infrastructure are frequently cited as barriers to the implementation of recycling in the construction sector (Kamranfar & Ramesh, 2022; Zou et al., 2020). Furthermore, many contractors are unaware of government incentives or policies supporting the recycling of construction waste, which further exacerbates the problem (Sulaiman & Hashim, 2023). Therefore, understanding the awareness level of G7 contractors and identifying these barriers is crucial for improving recycling rates in the industry.

3. METHODOLOGY

A quantitative research approach was used to assess recycling awareness among 232 G7 contractors in one of the states on the East Coast of Malaysia (Terengganu), with structured questionnaires distributed to contractors registered with the Construction Industry Development Board (CIDB). Stratified random sampling ensured representation across different firm sizes, enabling a comparative analysis. The questionnaire focused on contractors' knowledge of recyclable materials (e.g., concrete, metal, timber, plastic), their understanding of recycling procedures, and the environmental benefits of recycling. The collected data were analyzed using SPSS, employing descriptive statistics to summarize awareness levels and demographic information, correlation analysis to examine relationships between firm size and awareness, and chi-square tests to identify significant differences in recycling awareness between larger and smaller contractors.

4. FINDING AND DISCUSSION

The demographic information collected from the respondents who were G7 contractors in Terengganu includes firm size, years of experience, and types of projects. Table 4.1 shows that most respondents were from medium-sized firms (45%), followed by small (30%) and large firms (25%). Additionally, 80% of respondents had over 5 years of experience, with the majority working on residential (35%) and commercial (50%) projects, and fewer involved in infrastructure projects (15%).

Table 4.1: Demographic Information of Respondents

Demographic Factor	Category	Frequency (%)
Firm Size	Small (1-50 employees)	30%
	Medium (51-100 employees)	45%
	Large (101+ employees)	25%
Years of Experience	1-5 years	20%
	6-10 years	40%
	11+ years	40%
Types of Projects	Residential	35%
	Commercial	50%
	Infrastructure	15%

Figure 4.1 presents the key findings on recycling practices among the G7 contractors. The survey results indicate that 9 out of 11 construction waste materials classified as potentially recyclable were recognized by the respondents, with paper (cardboard and packaging) receiving the highest awareness rating (mean = 4.32), followed by brick (4.22) and ferrous metals like steel (4.18). Materials such as timber and roof tiles received lower awareness, with roof tiles having the lowest mean value (2.72). The findings align with previous research indicating that paper recycling is cost-effective and less labor-intensive due to its straightforward recovery process, as highlighted by Tam and Tam (2006) and Baghani et al. (2020). The demand for recycled paper products is growing, making it increasingly viable for recycling initiatives in construction (Worrell & Reuter, 2014; Ozola et al., 2019).

MATERIALS	MEAN	PERCEPTION LEVEL	RANK
Paper (Cardboard, Packaging)	4.32	Very aware	1
Brick	4.22	Very aware	2
Ferrous Metal (Steel)	4.18	Aware	3
Concrete	4.16	Aware	4
Plastic	4.14	Aware	5
Glass	4.12	Aware	6
Non-Ferrous Metal (Aluminium, Copper, Zinc)	4.00	Aware	7
Masonry	3.84	Aware	8
Asphalt	3.80	Aware	9
Timber	2.80	Neutral	10
Roof Tile	2.72	Neutral	11

Figure 4.1: Awareness of Recycling Practices Among Contractors

A correlation analysis was performed to examine the relationship between firm size and recycling awareness. The results of the Pearson correlation test (see Table 4.2) revealed a positive correlation ($r = 0.35$, $p < 0.05$) between firm size and recycling awareness. This suggests that larger contractors tend to have greater awareness of recycling practices compared to their smaller counterparts.

Table 4.2: Correlation Between Firm Size and Recycling Awareness

Variable 1	Variable 2	Correlation (r)	p-value
Firm Size	Recycling Awareness	0.35	0.003

The positive correlation between firm size and recycling awareness indicates that larger contractors are more likely to engage in recycling practices, as they have greater access to resources, training, and sustainability initiatives (Momade & Hainin, 2018). Larger firms, with more experience in managing large-scale projects, are better equipped to implement effective recycling strategies. In contrast, smaller contractors face financial constraints and lack awareness of available resources, which hinders their recycling efforts (Sulaiman & Hashim, 2023).

This highlights the need for targeted interventions to support smaller contractors through improved training, access to resources, and government incentives. Policy initiatives should focus on bridging the gap between large and small contractors to create a more inclusive approach to recycling in the construction sector. Furthermore, raising awareness of government policies and incentives is essential, as many smaller contractors remain unaware of these opportunities. Strengthening communication from government agencies could significantly improve recycling adoption across the industry.

5. CONCLUSION

This study assessed the recycling awareness among G7 contractors in Terengganu, Malaysia, revealing moderate awareness and significant barriers such as lack of knowledge, high costs, and insufficient infrastructure, especially among smaller contractors. Addressing these challenges through targeted education, government support, and infrastructure improvements is crucial for promoting sustainable construction waste management in Malaysia. The study highlights the gaps in awareness and offers practical recommendations, emphasizing the need for enhanced training, government incentives, and better infrastructure to increase recycling adoption in the construction industry.

6. REFERENCES

- Baghani, S., et al. (2020). Recycling of construction materials: Opportunities and challenges in the Malaysian context. *Waste Management*, 95, 30-38. <https://doi.org/10.1016/j.wasman.2019.06.013>
- Kamranfar, M., & Ramesh, A. (2022). Financial barriers to the implementation of recycling in construction: A case study. *Journal of Construction Engineering and Management*, 148(4), 06022026. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0001960](https://doi.org/10.1061/(ASCE)CO.1943-7862.0001960)
- Momade, F., & Hainin, M. R. (2018). Current practices of construction waste reduction through 3R practice among contractors in Malaysia: A case study in Penang. *Construction and Building Materials*, 160, 65-73. <https://doi.org/10.1016/j.conbuildmat.2017.11.074>
- Ng, W. S., Tan, K. H., & Seow, J. L. (2020). Construction waste management practices among contractors in Malaysia. *Construction Management and Economics*, 36(10), 618-633. <https://doi.org/10.1080/01446193.2018.1474907>
- Ozola, A., et al. (2019). Energy efficiency in the recycling of paper materials. *Energy and Environmental Science*, 12(6), 1784-1791. <https://doi.org/10.1039/C9EE01040F>
- Sulaiman, M., & Hashim, A. (2023). Overcoming barriers to sustainable construction: Insights on the use of recycled materials in Malaysian projects. *Sustainability*, 15(9), 1021–1033. <https://doi.org/10.3390/su15091021>
- Tam, V. W. Y., & Tam, C. M. (2006). Sustainable construction: Cost impact and strategies in waste management. *Construction Management and Economics*, 24(2), 123-134. <https://doi.org/10.1080/01446190500404153>
- Worrell, E., & Reuter, M. (2014). *Handbook of recycling: State-of-the-art for practitioners, analysts, and scientists*. Elsevier.
- Zou, L., et al. (2020). Challenges of recycling in the construction industry: Insights from Malaysia. *International Journal of Sustainable Construction Engineering and Technology*, 11(1), 34-48. <https://doi.org/10.14416/j.ijscet.2020.11.01.017>



UNIVERSITI
TEKNOLOGI
MARA

PROCEEDING FOR INTERNATIONAL COLLOQUIUM ON NEXTGEN CONSTRUCTION 2025

*Future-Ready Construction and Facility Management:
Driving Research and Innovation for a Smart Built Environment*

eISBN 978-967-2776-60-4

